

Penstemon penlandii, spec. nov. (SCR) from Colorado

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Middle Park is one of a series of high altitude mountain valleys between the Front Range and the Northern Gore Range of the Rocky Mountains in Colorado. Its county seat is Kremmling, and the Colorado River arises here in Grand Lake. The area of the Park north of the Colorado River is arid, a region of seleniferous clay soils. A small amount of local endemism in the Flora occurs, the most notable species in this pattern being *Astragalus osterhoutii* M. E. Jones which is confined to selenium soils in the Park. *Physaria osterhoutii* Payson, is also endemic here. *P. harringtonii* Penland ranges from Middle Park slightly westward through the Colorado River canyon to the junction of the Eagle and Colorado rivers.

This paper describes a new species of *Penstemon*, Sect. *Glabri* (Rydberg) Pennell which is apparently endemic to a small part of the area occupied by the narrowly endemic *Astragalus osterhoutii*.

Penstemon penlandii is an obligate selenophile most closely related to *P. paysoniorum* Keck of southwestern Wyoming, a species also restricted to seleniferous shales. It differs from the latter by having retrorsely puberulent, rather than glabrous, stems and foliage, linear, rather than oblanceolate, leaves, and a smaller corolla (less than 15 mm long). The staminode in each species is truncate and sparsely bearded distally with pale yellow trichomes. The shape of the staminode and the relative density of the beard is generally glossed over in descriptions, but there may well be important points of coincidence and difference if the feature were given systematic study over the group. *Penstemon aridus* Rydberg, of Montana and northern Wyoming, bears a superficial resemblance to *P. penlandii* but there the corolla is glandular-pubescent and bearded within, and the pollen sacs are glabrous, dehiscent throughout and explanate.

Penstemon penlandii W. A. Weber, sp. nov.

Penstemon paysoniorum sect. *Glabri* similis sed caulibus retrorso-puberulis, folia linearibus 1.0-1.5 mm longibus, corolla minus quam 15 mm longa.

Perennial herb from a loosely branched woody caudex arising from a short rhizome provided with long ropy unbranched roots. Vegetative branches few and short, crowned by tufts of leaves similar to the basal ones of flowering shoots. Flowering stems erect, up to 2.5 dm tall; stems and at least the lower parts of the

leaves retrorse-puberulent with minute eglandular (and glandular?) trichomes; basal leaves erect, entire, linear, involute, 1-1.5 mm wide; cauline leaves somewhat reduced, ascending. Inflorescence narrow, secund, up to 5 cm long, 5-15-flowered, in few-flowered cymes; axis, peduncles and calyces glabrescent; calyx 4-5 mm long, the sepals ovate, acute, the margins broadly scarious and erose-dentate. Corolla blue-violet, 12-15 mm long, tubular, gradually widened to the lobes, hardly 2-lipped, glabrous externally and internally, 5 mm wide at apex, not 2-ridged ventrally, the lobes as broad as long, 3 mm diam, overlapping the sinuses. Stamens and staminode included; staminode wider and truncate at the apex, sparsely bearded ventrally on distal third with pale orange hairs; anthers of fertile stamens moderately hairy with short, stiff trichomes; anther sacs 1.0-1.2 mm long, almost parallel at dehiscence but becoming explanate, dehiscing the full length but not across the connective, the sutures papillate-denticulate; capsule ovoid-conic, 12-14 mm long; seeds oblong-cuboidal, 3.5-3.7 x 1.5 mm, quadrangular, the dorsal face convex, the sides plane to concave, margins thin-edged.

HOLOTYPE: Colorado: Grand County. Middle Park, 3.8 miles north of Colorado River along Troublesome Creek road above east bank of the creek on strongly odoriferous selenium clay knolls, 2,440 msm, T. 2 N., R. 29 W, Sec. 30, 30 July 1986, Weber & Dahnke 17230 (COLO). Isotypes, mostly in fruit, have been distributed to the following herbaria: BRY, GH, KANU, MO, NMC, NY, TEX, UC, US, UTC, WY.

This species is dedicated to Dr. C. William T. Penland, (1899-1982), professor at Colorado College who had a life-long interest in the Colorado Flora, especially *Penstemon*, and who contributed the treatment of the genus for Harrington's *Flora of Colorado*.

Penstemon penlandii was discovered by David L. Johnson, Western Resource Development Co., on a survey for the relocation of a high power line. The type material, consisting of flowering and fruiting plants, was collected two weeks later by the authors.

At the type locality *Penstemon penlandii* showed a distinct preference for relatively barren slopes. The most luxuriant plants were those growing from seed washed down the slopes by torrents, germinating in deep runoff channels in the shade afforded by the cut-banks. The development of relatively few stems from a well-developed but short rhizome suggests that the function of the rhizome is not so much to furnish nodes for the production of adjacent clumps (several clumps are only rarely found together and then not connected by rhizomes) but to give the plant some stability against dislodgement by torrential rains. *P. paysoniorum* shares this attribute.

The population is limited to strongly seleniferous clay-shales. These extend for about two miles along and above the east side of the road. Where erosion mixes the seleniferous substrate with less toxic material from above, the flora becomes dominated by sagebrush and large mats of *Penstemon caespitosus*, *Townsendia leptotes*, and *Penstemon penlandii* disappears. The tops of the knolls tend to be better vegetated with matformers, especially *Lesquerella alpina* ssp. *parvula*. From a distance one can predict the occurrence of the *Penstemon* by noting the presence of *Aletes megarrhiza* on the slopes. This proved to be an infallible way of finding *Penstemon* stands, at least at the type locality.

In order to determine whether the coexistence of the two species was real or coincidental, a search was made of a very large *Aletes* stand four miles south of Kremmling across the Colorado River. That, however, was on a darker, less seleniferous shale, and there the *Penstemon* was not found. So despite their apparent fidelity to each other in one site, the absence of *Penstemon* on the second area suggests that the two species indeed have different requirements or tolerances.

The distribution of two other selenium soil species abundant in the Park presents a phytogeographical anomaly. Both *Townsendia leptotes* (Gray) Osterh. and *Lesquerella alpina* ssp. *parvula* (Greene) Rollins & Shaw are abundant on these substrates at 2,400 meters but are altitudinally disjunct to limestone substrates on high alpine peaks at over 3,600 meters. A similar distributional anomaly involves *Townsendia rothrockii* A. Gray ex Rothrock, which characteristically is a snowbed plant in the alpine tundra but reappears in openings of *Pinus ponderosa* forests at less than 3,000 meters on the Uncompahgre Plateau. The low dense mat growth form of these taxa probably has adaptive value for their occurrence in these disparate habitats. *Penstemon penlandii* does not share their growth form, however, and should not be expected to recur in the alpine.